UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,966	10/03/2003	Deepakraj M. Divan	056410-0114	7307

23524 7590 06/07/2005

FOLEY & LARDNER
150 EAST GILMAN STREET
P.O. BOX 1497
MADISON, WI 53701-1497

EXAMINER	
SQUIRES, BRETT S	
ART UNIT	**PAPER NUMBER**
2836	

DATE MAILED: 06/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/678,966	**Applicant(s)** DIVAN ET AL.	
	Examiner Brett S. Squires	**Art Unit** 2836	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 October 2003*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-13 and 16-33* is/are rejected.
7)☒ Claim(s) *14 and 15* is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *27 September 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *02/24/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

1. The formal drawings filed on September 27, 2004 have been received and are accepted by the examiner.

Claim Objections

2. Claims 14 and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-6, 8-11, 13, 16-19, 21-23, 25-28, and 31-33 are rejected under 35 U.S.C. 103(a) as being obvious over Fernandes (US 4,829,298) and ("Static synchronous series compensator: a solid-state approach to the series compensation of transmission lines," Gyugyi, L.; Schauder, C.D.; Sen, K.K.; Power Delivery, IEEE Transactions on Volume 12, Issue 1, Jan. 1997 Page(s): 406-417).

Fernandes discloses an electrical power line monitoring system having a single phase main transformer primary formed to attach to a power transmission line without breaking the line such that the power line forms the secondary of the main transformer ("Iron Core" figures 5-7 ref# 86 and col. 6 lines 36-55), an electrical energy storage device ("Re-chargeable back-up power" figure 7 ref# 116 and col. 7 line 28-47), a controller contained in the housing ("Signal processing & sampling, storage & control" figure 7 ref# 120, "Digital computer" figure 8 ref# 148, col. 7 lines 28-68, and col. 8 lines 1-5) and the module is electrically isolated from ground and from other phase lines of the transmission system ("module" figures 1A and 1B ref# 10).

Fernandes further discloses the main transformer primary has a core that is split longitudinally into sections so that it can be opened up to allow the transformer primary core to fit over a transmission line and to close the sections of the transformer primary core together to mount the transformer primary winding to the transmission line (figure 6, col. 6 lines 36-68, and col. 7 lines 1-10).

Fernandes does not disclose:

A. a switching circuit formed of gate controlled switching devices connected to the electrical energy storage device to exchange power therewith and having output lines connected to the main transformer primary

B. a controller connected to the switching devices in the switching circuit to control the switching of the switching devices for transfer of power between the main transformer primary and the electrical energy storage device to provide a selected impedance injected in the transmission line coupled through the main transformer primary

Gyugyi discloses a static synchronous series compensator having a switching circuit formed of gate controlled switching devices ("Voltage Sourced Inverter" figure 2 and pages 406-407) connected to the electrical energy storage device ("Capacitor" and "Optional Energy Source" figure 2 and pages 406-407) to exchange power therewith and having output lines connected to the main transformer primary ("Coupling transformer" figure 2 and pages 406-407).

Gyugyi further discloses the static synchronous series compensator has a controller ("Control" figure 2 and pages 406-407) connected to the switching devices in the switching circuit to control the switching of the switching devices for transfer of power between the main transformer primary and the electrical energy storage device ("Capacitor" and "Optional Energy Source" figure 2) to provide a selected impedance injected in the transmission line coupled through the main transformer primary (pages 406-410 and 412).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Fernandes to include a static synchronous compensator such as that taught by Gyugyi in order to compensate for the voltage drop across the resistive component of the line impedance and thus allow more power to be transmitted over the power lines ("Gyugyi" abstract).

Regarding Claim 2:

Fernandes discloses a transformer core ("Iron Core" figures 5-7 ref# 86 and col. 6 lines 36-55) having two power pick-off coils wound around the core in a toroidal shape

("Power pick-off coils" figure 7 ref# 88,90 and col. 7 lines 28-47), but does not disclose the main transformer primary has a winding which comprises multiple turns of wire wound in a toroidal shape with sections of the wire extending in a longitudinal direction parallel to the transmission line when the transformer primary winding is mounted on the transmission line.

Gyugyi discloses a coupling transformer ("Coupling transformer" figure 2 and pages 406-407) for transfer of power between the main transformer primary and the electrical energy storage device to provide a selected impedance injected in the transmission line coupled through the main transformer primary.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified Fernandes to wrap the windings of the coupling transformer such as that taught by Gyugyi around the transformer core already present in Fernandes in order to reduce the weight and size of the line mounted modules by reducing the number of heavy transformer cores contained in the module.

Regarding Claims 3, 17, and 32:

Fernandes discloses the main transformer primary has a core that is split longitudinally into sections so that it can be opened up to allow the transformer primary core to fit over a transmission line and to close the sections of the transformer primary core together to mount the transformer primary winding to the transmission line (figure 6, col. 6 lines 36-68, and col. 7 lines 1-10).

Regarding Claim 5, 19, and 33:

Fernandes discloses a radio receiver mounted in the housing and connected to the controller to provide command signals to the controller transmitted through a radio communications link to the radio receiver ("950Mhz Receiver" figure 7-8 ref# 126, col. 7 lines 28-47 and col. 8 lines 20-48).

Regarding Claims 6 and 16:

Gyugyi discloses the switching circuit is an inverter formed of gate controlled switching devices connected in a bridge configuration and the inverter is connected between DC bus lines that are connected to the electrical energy storage device ("Voltage Sourced Inverter" figure 2 and pages 406-407).

Regarding Claims 9-10, 21-22, and 31:

Please see Gyugyi pages 406-410.

Regarding Claims 11 and 23:

Fernandes discloses an auxiliary transformer winding adapted to be coupled to a transmission line without breaking the line and to draw power therefrom and to supply power at output terminals thereof to the controller ("Power pick-off coils" figure 7 ref# 88,90 and col. 7 lines 28-47).

Regarding Claims 27-28:

Fernandes discloses attaching the electric power line monitor and compensation modules on each of three phase line of the three phase power transmission system at multiple locations over a power system transmission grid ("modules" figures 1-3 ref# 10, col. 3 lines 42-68 and col. 4 lines 1-49).

5. Claims 7 and 20 are rejected under 35 U.S.C. 103(a) as being obvious over Fernandes (US 4,829,298) and ("Static synchronous series compensator: a solid-state approach to the series compensation of transmission lines," Gyugyi, L.; Schauder, C.D.; Sen, K.K.; Power Delivery, IEEE Transactions on Volume 12, Issue 1, Jan. 1997 Page(s): 406-417) and Kitagawa (US 5,585,651).

The above stated combination of Fernandes and Gyugyi discloses an electrical power line monitoring and compensation system having an inverter formed of GTOs with anti-parallel diodes in a bridge configuration and the inverter is connected between DC bus lines that are connected to the electrical energy storage device ("Gyugyi" figure 2 and pages 406-407), but does not disclose the gate controlled switching devices are IGBTs including an anti-parallel diode.

Kitagawa discloses replacing GTOs with IGBTs (col. 1 lines 48-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the above stated combination of Fernandes and Gyugyi to include using IGBTs such as those taught by Kitagawa in order to for the inverter to achieve a higher maximum cut-off current density ("Kitagawa" col. 1 lines 60-62).

6. Claims 12, 24, and 30 are rejected under 35 U.S.C. 103(a) as being obvious over Fernandes (US 4,829,298) and ("Static synchronous series compensator: a solid-state approach to the series compensation of transmission lines," Gyugyi, L.; Schauder, C.D.; Sen, K.K.; Power Delivery, IEEE Transactions on Volume 12, Issue 1, Jan. 1997 Page(s): 406-417) and Gyugyi (US 5,343,139).

The above stated combination of Fernandes and Gyugyi discloses an electrical power line monitoring and compensation system having a sensor for sensing the current through a power transmission lines (Fernandes: "Rogowski Coil" figure 5,8,13B,15A ref# 84 and col. 6 lines 36-55), but does not disclose the controller controls the switching circuit to inject a positive inductance into the transmission line to help limit the fault current in response to the detection of a fault current in the power transmission line.

Gyugyi discloses a generalized fast power flow controller that limits fault current through the adjustment of line impedance (col. 13 lines 6-27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the above stated combination of Fernandes and Gyugyi to include adjusting the line impedance to limit fault current such as that taught by Gyugyi in order to prevent the equipment being feed by the power lines from being damaged by high fault currents.

7. Claim 29 is rejected under 35 U.S.C. 103(a) as being obvious over Fernandes (US 4,829,298) and ("Static synchronous series compensator: a solid-state approach to

the series compensation of transmission lines," Gyugyi, L.; Schauder, C.D.; Sen, K.K.; Power Delivery, IEEE Transactions on Volume 12, Issue 1, Jan. 1997 Page(s): 406-417) and Couture (US 6,486,569).

The above stated combination of Fernandes and Gyugyi discloses an electrical power line monitoring and compensation system having electric power line monitor and compensation modules attached to each of the three phase lines of the three phase power transmission system at multiple locations over a power system transmission grid, but does not disclose diverting the flow of power partially from one set of transmission lines to another set of transmission lines.

Couture discloses power flow management in an electric power grid that diverts the flow of power partially from one set of transmission lines to another set of transmission lines column 2 line 30 through column 4 line 34).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the above stated combination Fernandes and Gyugyi to include a power flow management system such as that taught by Couture in order to maintain the power flow within safe and stable limits on each transmission line ("Couture" col. 1 lines 30-57).

Conclusion

8. The examiner would like to point out that the naming convention used for determining the primary and secondary sides of a transformer is based on point of reference. The prior art made of record and not relied upon is considered pertinent to

the applicant's disclosure. Additional prior art of interest includes but is not limited to the following US Patents and Publications, Foreign Patents and Publications and Non-patent Literature: Waldemar (US 4,551,700) discloses a toroidal power transformer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brett S. Squires whose telephone number is (571)272-2268. The examiner can normally be reached on 9am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sircus can be reached on (571)272-2058. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Brett S Squires
Examiner
Art Unit 2836

Stephen W Jackson
6-3-05

STEPHEN W. JACKSON
PRIMARY EXAMINER